CLAIMS:

What is claimed is:

1. A surface emitting semiconductor laser system, comprising:

a first waveguide having an outcoupling aperture;

a first arrayed waveguide grating structure at a first end of the first waveguide, and a second arrayed waveguide grating structure at a second end of the first waveguide;

wherein the first arrayed waveguide grating structure couples the first end of the first waveguide to a first plurality of waveguides, each waveguide of the first plurality of waveguides including a reflector;

wherein the second arrayed waveguide grating structure couples the second end of the first waveguide to a second plurality of waveguides, each waveguide of the second plurality of waveguides including a reflector.

2. The system of Claim 1, further comprising a second waveguide, a first end of the second waveguide coupled to the first waveguide between the outcoupling aperture and the first arrayed waveguide grating structure by a first switch, a second end of the second waveguide coupled to the first waveguide between the outcoupling aperture and the second arrayed waveguide grating structure by a second switch.

3. The system of Claim 2, wherein light in the semiconductor laser system is modulated by altering states of the first and second switches.

4. The system of Claim 2, wherein losses of the outcoupling aperture are roughly equal to the losses of the second waveguide such that the photon density in the semiconductor laser system remains roughly constant.

5. The system of Claim 1, wherein each reflector of first plurality of waveguides matches a reflector of the second plurality of waveguides, and wherein each reflector of the first plurality of waveguides reflects a different central wavelength.

6. The system of Claim 1, wherein the reflectors of the first and second pluralities of waveguides are distributed Bragg reflectors.

7. A method of modulating a signal in a surface emitting semiconductor laser system, comprising the steps of:

providing a first waveguide having means for reflecting at first and second ends and an outcoupling aperture between the first and second ends;

coupling a first end of a second waveguide to the first waveguide at a first switch between the first end and the outcoupling aperture;

coupling a second end of the second waveguide to the first waveguide at a second switch between the second end and the outcoupling aperture;

wherein altering the states of the first and second switches modulates light coupled out of the outcoupling aperture; and

wherein the loss of the second waveguide is balanced against the loss of the outcoupling aperture such that the photon density in the laser system remains relatively constant.

8. The system of Claim 7, wherein the means for reflecting comprise multiply resonant distributed Bragg reflectors.

9. The system of Claim 7, wherein the means for reflecting comprise arrayed waveguide grating structures that couple light from the first waveguide into one of a plurality of waveguides, each waveguide of the plurality having a reflector capable of reflecting a single central wavelength signal of the system.

10. A semiconductor laser system, comprising:

a first waveguide having a first reflector at a first and a second reflector at a second end;

an outcoupling aperture positioned between the first and second reflectors;

a second waveguide connected to the first waveguide on either side of the outcoupling aperture, a first end of the second waveguide being connected to the first waveguide by a first

switch, a second end of the second waveguide being connected to the first waveguide by a second switch;

wherein altering the states of the first and second switches modulates light coupled out of the outcoupling aperture; and

wherein the first reflector and the second reflector each comprise multiply resonant distributed Bragg reflectors.

11. The system of Claim 10, further comprising a third waveguide connected to the first waveguide on either side of the outcoupling aperture, a first end of the third waveguide being connected to the first waveguide by a third switch, a second end of the third waveguide being connected to the first waveguide by a fourth switch.

12. The system of Claim 11, wherein the first reflector reflects light of first and second wavelengths, and the second reflector reflects light of the first and the second wavelengths;

wherein the first and second switches couple light of the first wavelength into the second waveguide;

wherein the third and fourth switches couple light of the second wavelength into the third waveguide; and

wherein light of the first wavelength is modulated by altering the states of the first and second switches, and light of the second wavelength is modulated by altering the states of the third and fourth switches.

13. A surface emitting semiconductor laser system, comprising:

a central waveguide having an outcoupling aperture;

first means for reflecting a plurality of wavelengths coupled to a first end of the central waveguide;

second means for reflecting the plurality of wavelengths coupled to a second end of the central waveguide;

wherein for each wavelength of the plurality, there is an alternate waveguide coupled to the central waveguide by a pair of switches, one switch of the pair being positioned on either side of the outcoupling aperture; and

wherein each wavelength of light is modulated by altering the states of the switches.

14. The system of Claim 13, wherein the first and second means for reflecting the plurality of wavelengths comprise multiply resonant distributed Bragg reflectors.

15. The system of Claim 13, wherein the first and second means for reflecting the plurality of wavelengths comprise arrayed waveguide grating structures that couple each of the plurality of wavelengths into a different waveguide, each of the different waveguides having a reflector attached thereto.

16. A surface emitting semiconductor laser system, comprising:

a first waveguide having an outcoupling aperture;

an arrayed waveguide grating structure at a first end of the first waveguide;

a first reflector at a second end of the first waveguide;

wherein the arrayed waveguide grating structure couples the first end of the first waveguide to a first plurality of waveguides, each waveguide of the first plurality of waveguides including an associated reflector.

17. The system of Claim 16, wherein the first reflector is a deep grating broadband reflector.

18. The system of Claim 16, wherein the associated reflectors comprise distributed Bragg reflectors.

19. The system of Claim 16, further comprising a second waveguide, a first end of the second waveguide coupled to the first waveguide between the outcoupling aperture and the arrayed waveguide grating structure by a first switch, a second end of the second waveguide coupled to the first waveguide between the outcoupling aperture and the first reflector by a second switch.

20. The system of Claim 19, wherein light in the semiconductor laser system is modulated by altering states of the first and second switches.

21. The system of Claim 19, wherein losses of the outcoupling aperture are roughly equal to the losses of the second waveguide such that the photon density in the semiconductor laser system remains roughly constant.

22. An optical signal receiver system, comprising:

a first waveguide having an input aperture;

an arrayed waveguide grating structure at a first end of the first waveguide;

wherein the arrayed waveguide grating structure couples the first end of the first waveguide to a first plurality of waveguides;

wherein each waveguide of the first plurality of waveguides couples to a detector.

23. The system of Claim 22, wherein each waveguide of the first plurality of waveguides includes an associated detector, and wherein each associated detector monitors light of a different central wavelength.